

## **Spectacle Support System**

The present invention relates to apparatus that reduces  
5 discomfort for wearers of conventional spectacles and devices that  
use spectacle-like fitment.

Typically, a conventional spectacle frame rests on the nose,  
balances on the ears and anchors around the ears. Even if the  
10 perfect fitment is attained, prolonged wearing of spectacles leads  
to discomfort, as there is constant pressure on the nose, and to a  
lesser extent, pressure around the ears region. Discomfort due to  
nasal pressure can be particularly acute for wearer with heavy lens  
prescriptions or wearer of heavy optical devices that rely on  
15 spectacle frame type of fitment e.g. heavy goggles, some head-  
mount display and medical optical devices such as binocular loupe,  
which does not have additional support mechanism. The current  
common solutions are via the use of non-conventional spectacles  
with headband or other headwear support, or an unsightly  
20 headband support that can be used on conventional spectacles,  
which alleviate pressure around the ear area. Other solutions also  
include the use of special nose-guard, cheek-lifts, and even using  
adhesive tape to reduce pressures from the nasal and/or ear  
regions. For the average wearer of conventional spectacles, the  
25 above solutions are inconvenient, expensive or cosmetically  
undesirable.

It is an aim of embodiments of the present invention to  
provide a highly adaptable spectacle support system, which utilises  
30 innovative support systems in conjunction with common headwear  
apparels or specially designed headwear that would at least partly  
mitigate the above-mentioned problems. Unlike other related

inventions which also utilise a headwear as a kind of weight transfer support (see for example patents GB2337443, US5056164, US4636048, EP1124152, WO9322946, US2004701), the present invention does not require specially adapted spectacle  
5 as are apparent from these prior arts: any conventional spectacle as already worn by a spectacle wearer could benefit from the present standalone invention which acts on the temple arms of the spectacle. Pressures around the nose and/or ears can be minimised by providing lifting action on the temple arms of the spectacle via  
10 the use of an extended and adjustable support system, which transfer some or all of the weight of the spectacle to the headwear. Note, unlike some prior acts, the weight transfer is subtly and accurately transferred to the headwear without necessarily altering the normal position of the spectacle frame as normally worn by a  
15 spectacle user with prescription lenses.

Furthermore, sideways pressures from the temple arms of the spectacle can also be reduced or increased via the transfer of sideways pressures on to the supporting system. By using common  
20 headwear as part of the current spectacle supporting system, it serves to make the purpose of the current invention cosmetically much more desirable, and considerably more convenient and comfortable to use. In the case of one embodiment of this invention, which utilise magnetic elements, the support system,  
25 apart from the headwear, is almost completely inconspicuous, thus improving the product's cosmetic appeal. Using the present invention, wearer of conventional spectacles or other heavy spectacle-fitting device will experience a significant reduction in discomfort as contact pressures due to wearing the spectacle is  
30 reduced or entirely removed. The invention is also particularly useful to spectacle wearers that tend to have low nasal bridges,

such as very young children or some people of non-Caucasian ancestry. The use of the current invention will also reduce or eliminate sores, or production of excess grease or perspirations in the contact skin regions. Spectacle wearer with facial  
5 abnormalities or sensitive skin conditions may also benefit from using the present invention. The user may also notice an additional beneficial effect of improved stability of the spectacle frame, which may confer some advantages in some sporting activities. There is further application in the fashion industry, as it  
10 is now possible to design very elaborate and hence potentially very heavy spectacle design, which can now be worn comfortably when combined with the use of the current invention.

The generic form of the invention comprises: -

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- a) A form of headwear e.g. baseball cap, visor cap, hats, headband, helmet.
- b) One or more support rods, or strings. Each rod or string may be of fixed or of adjustable length. The upper part of the rod  
20 or string is attached to a), preferably to part of a) which protrudes beyond the circumference of the head e.g. the brim of a hat or cap. The attachment may be fitted permanently or detachably to a). The lower end of each rod or string has detachable means to attach to the temple arm  
25 of a spectacle.
- c) Means of securing the upper part of b) to a), with potential to adjust the vertical and/or lateral positions of the supporting rods or strings
- d) Detachable means of attaching the temple arms of the  
30 spectacle with the lower end of b). For example, in the case of using a support rod, the lower end of the rod could be of a

hook-shaped design that can be used to support the temple arm of the spectacles. In the case of a supporting string, a powerful mini magnet may be attached to its lower end, which can then act to lift the temple arm of the spectacle if it has magnetically attractive elements within it e.g. containing ferromagnetic materials in the temple arms of the spectacle frame. If the temple arms of the spectacle do not already have magnetically attractive material within it, then it is possible to put an attachment containing magnetically attractive materials through each temple arm. When the upper part of b) is adjusted and securely attached to a) as described in c) above, the invention will thus alleviate nasal and/or ear pressures by transferring the weight of the spectacle to the headwear. Note, lateral pressures due to the temple arms on the temple of the head may also be reduced or increased, since depending on the lateral orientation of the supporting rods or strings, they may also provide horizontal (lateral) as well as vertical tension within the supporting rod or string systems. Note lateral compression pressure is possible only with the solid supporting rods system.

e) There can be variations in the invention. For example, as an alternative supporting mechanism to d), the invention can be used by means of supporting the nose bridge of the spectacle using the lower end of b). Also, transferable versions of the spectacle support systems are also proposed below, which allows it to be used on different headwear. Furthermore, it is also proposed that spectacles may be designed specially to include magnetically attractive elements built within its frame (e.g. in part of the temple arms or nose bridge of the frame), such that it can be used with the magnetic supporting

mechanism described in d) above, without the use of magnetic attractive attachments.

The invention and several variants will now be described solely  
5 by way of example and with reference to the accompanying drawings in which:

FIGURE 1 shows a spectacle user wearing an embodiment of the present invention.

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FIGURE 2 shows an embodiment of the invention consisting of a cap with a headwear-support rod attachment system, which allows height and lateral adjustments of the support rod.

15 FIGURE 3 shows a cap-support rod attachment system using a spring-loaded stopper.

FIGURE 4 as Figure 1, except the support rod are replaced by a string-magnet support system and the spectacle wearer is not  
20 shown.

FIGURE 5 shows a transferable version of the spectacle support system, and its application demonstrated on a standard cap.

25 FIGURE 6 shows a different application of the spectacle support system, with the support rod acting on the nose bridge of the spectacle.

FIGURE 7A shows a tilted front-on view of a well-designed  
30 spectacle support system headwear, incorporating several design features mentioned in this application.

FIGURE 7B shows the underside view of the spectacle support system of figure 7A, with the support rods folded in the non-use position.

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FIGURE 8A shows a tilted front-on view of a fully adjustable string-magnet spectacle support system headwear.

FIGURE 8B, shows the underside view of the same article as figure 8A, revealing the components of the length adjustable string system.

In the drawings like reference numerals refer to like parts.

15        Figure 1 shows a spectacle wearer using an example of the present invention, which comprises a headwear with a brim 11, with two independent length adjustable support rods 12, each attached to the brim of the cap. The headwear-rod attachment method may be permanent (e.g. part of the rod is securely stitched  
20    In the brim of the headwear) or detachable (e.g. by means of using clips, hinges, pins, stoppers or cord locks, snap-on/off buttons, Hook and loop fastener or Velcro as is more commonly known, or some other suitable methods for the rod-headwear attachment). A novel method is described in figure 2 below. The lower end of the  
25    rod is shaped in a partial hook-shaped form 14, so as to enable each temple arm 15 of the spectacle, to rest stably on each support rod, thus reducing nasal pressure once the length of each rod is adjusted accordingly. The use of a lightly bent hook shape design rather than a fuller hook design is so that it only lightly secures the  
30    temple arm of the spectacle, thus allowing quick and easy engagement or disengagement of the support rods 12 with the

spectacle. In fact, for most non-physically active situation, a simple L-shape tip design is sufficient, whereas in some other situations, a more secure attachment may be preferred e.g. a sideways U-shape tip for the temple arm to rest in. The tip should be covered by a soft resilient material (e.g. latex or rubber type material) for superior grip and safety. The positions of the attachments as shown are such that nasal pressure is most effectively minimised or eliminated totally, as most of the spectacle weight, via the non-skin contact region of the temple arms 15 are resting on the tips of the rod. It is also possible to reduce the pressures around the ear, if the attachment position (or additional attachment) is situated nearer to the ear, such that the support rod can support the temple arm nearer to the ear. Note the support rods may naturally have some flexibility to move about the vertical axis direction as indicated by the arrow 13, because of the flexibility of the brim and/or the support rods are naturally flexible.

In general, the support rod can be made of most solid materials as desired. The lower end of the support rod may also be malleable to further enhance fitment with different temple arm types of different spectacle frames. The length adjustment feature of the support rod can be achieved via the usual means such as a two-piece telescopic arrangement.

The following paragraphs before the description for Figure 2 describes some additional design features not shown in Figure 1. Another arrangement is to construct the support rod 12 with a resistive stretchable and/or bendable section that allows the support rod to be readily stretched or compressed and/or bent to the desired length and orientation respectively, and allows it to remain stably in that position even when it is supporting the weight

or against the lateral pressure exerted by the temple arm of the spectacle. A rather less stable example of this type of section can be observed in the common plastic drinking straws with a bendable and stretchable 'concertina' section. The adjustment mechanism  
5 can be achieved via many methods: the 'concertina' type section of the support rod may be situated immediately below the brim, so that the support rods can be simply adjusted to lie under the brim as required. Some of these features are described in another embodiment as revealed in a later figure. Alternatively, the  
10 attachment of the support rods with the brim may be via the use of resistive hinges or swivel attachments, which allows it to freely fold underneath the brim of the hat. For perfect fitment with the shape of the brim when the support rods are folded, the latter may be designed to shape conformably to the curve of the brim.

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Note, the support rods 12 could be made without any length adjustment feature; it is quite possible to gain sufficient comfort and fitment requirements by simply adjusting the headwear itself. A particular suitable material for constructing the support rods 12  
20 of fixed length is to utilise a common hat strengthening material called 'brim reed' which is very strong, light, flexible and malleable. For example, the support rods shown in figure 1 can be simply constructed by first attaching a long single piece of brim reed securely stitched on the underside of the hat's brim, followed by  
25 bending the two ends of the brim reed to form the hanging section of the support rods 12, and with the hook-shape ends 14 created by further bending of the ends of the brim reed. Typically, the support rod of fixed length would be of the region of between two to four centimetres in length, depending on the preference of the  
30 wearer e.g. a short support rod implied that the wearer is wearing the headwear, such that its brim is very close to the frame of the



spectacle, and vice versa. Hence, for embodiment of the present invention with fixed support rod length, it is desirable to add a further pair of support rods of a different length to the first pair, so as to offer a wider option to a typical user. Any unused supporting  
5 rods could be held neatly, by folding it just beneath the brim and securely tied to the brim by a clip or hook also situated on the underneath side of the brim.

For cosmetic and design appeals, the support rod may be  
10 clear or transparent, or in any colour or patterns that one prefers. When the supporting rod is not being used, it may also be hidden away by adjusting it to lie on the underside of the brim of the hat.

Figure 2 illustrates a novel example of how a support rod 12  
15 of fixed or adjustable length can be attached to the headwear. The brim 11 of the headwear has embedded within it, a circularly shaped rubber inserts 16 with thorough cuts made within it (hereafter this insert will be referred to as a compressed holder). The support rod is then simply inserted through the cuts and its  
20 position remains fixed within it due to the compression of the rubber or similar materials that offer natural compression tension. In figure 2, the cuts made in the compressed holder 16, are made in the shape of a cross. The compressed holder design allows free vertical adjustment of the support rod, as well as limited lateral  
25 adjustments depending on the desired size and shape of the compressed holder and its cuts. If desired, a stopper may also be inserted through the upper part of the rod, on the upper side of the brim to completely secure the support rod from slipping downward. An example of a stopper being used is shown in figure 3.

Figure 3 shows a spring cord lock or similar spring-loaded stopper 17, is used to adjust and fix the support rod to the brim 11 of the headwear. For clarity, only one-rod support system is shown. The stopper 17 is securely attached to the brim 11, with  
5 the support rod 12 passing through the case of the stopper and so that the vertical position of the support rod can vary easily by depressing the spring-loaded button part of the stopper. The stopper 17 may be used in conjunction with the compressed holder as discussed earlier for maximum stability, or use on its own as  
10 shown in figure 3, which allows for vertical adjustment only.

In general, the descriptions given for figures 1 to 3 above are also applicable, if the solid support rod is replaced by a supporting string system, consisting of a string 18 and a magnetic tip 19, as  
15 shown in figure 4. The lower end of the string is attached a small powerful magnet e.g. a disc neodymium based magnet. The use of this type of powerful magnet means that very small magnet can be used for the purpose of lifting the weight of a spectacle. For example, the commonly available commercial neodymium disc  
20 magnet of only 3mm diameter and 2mm in depth has been found to be more than adequate to do the job. The string may be made of very thin but strong material, like nylon fishing line, so that beside the standard headwear, the support system is almost completely inconspicuous. The other advantage of using magnets  
25 as an attachment method to the spectacle frame is the ease of engaging or disengaging of the support system with the spectacle. In order for the string to act as a supporting system to the spectacle frame, it is necessary for the spectacle to contain magnetically attractive elements in the appropriate positions. This  
30 can be achieved in several ways: a) the spectacles may already have magnetic materials within its frame structure e.g. steel

screws used in the hinges of the temple arms, or the temple arms structure may consists of ferromagnetic materials which are capable of being attached to the magnets b) a specially designed spectacle frame which has magnetically attractive elements

5 strategically located in the frame to work with the magnetic support system. This may be especially relevant for spectacle wearer with facial abnormalities where more than two support rods or stings are used to alleviate pressures from both the nasal and ear regions and c) using an additional magnetic attractive

10 attachment that can be freely positioned to the temple arms 15 of the spectacle. A simple example is shown here in figure 4, which consists of a detachable attachment 20, which has, some magnetic attractive elements (e.g. this could be in the form of an elastolised sleeve containing ferromagnetic materials such as iron or steel)

15 embedded within it. The advantage of this option is that it can be used on any spectacle. Note the attachments 20 may also display the brand's name and/or logos as part of a fashion design feature. The double arrows 21 indicate the attractive forces between the magnetic elements 19 and 20. Note in general, the magnetic

20 elements 19 and 20 are for the purpose of mutual attractions; hence the elemental types can of course be interchanged as desired, although common design preference is mostly as prescribed. An interesting observation and possible preference mode of using the spectacle support system of figure 4 type is that

25 the length of the strings 18 can be so adjusted such that actual physical contact between the magnet 19 and the attachment 20 is not necessary, as magnetic force can acts over distance. The weight of the spectacles can still be reduced substantially without having a direct physical connection between the headwear part of

30 the spectacle support system and the spectacles, although the physical separation distance between the magnetic elements 19

and 20 would be quite small (i.e. typically 5mm or less, depending on the magnetic strengths of the magnetic elements used).

A useful feature that is not shown in Figure 4 would be a magnet-resting site, located on the underside of the hat's brim, within a distance reach of each of the supporting string. The magnetic resting site could simply be a site containing some magnetic attractive elements, so that when the strings 18 and magnets 19 are not in use, they can then simply be put away by attaching the magnets 19 on to their magnetic resting sites.

The use of magnetic support method can also apply to the solid support rod system of figures 1 to 3. In this case, the lower part of the support rod is made magnetic, which would then provide a magnetic attraction and support to the temple arms that have been made magnetically attractive e.g. by using magnetically attractive sleeve 20 as described above. Note the magnetic attractive system means the support rods do not need to use an L- or hook shaped tip as a supporting rest, thus allowing even more efficient and fine adjustments of the spectacle position relative to the hat.

Figure 5 shows a transferable version of the spectacle support system that is not specific to a headwear that has been adopted to accept the support rod or string supporting system. Instead, a clip-on device is incorporated to the upper part of the support rod or string system as described earlier. The clip-on device essentially consists of a clip 22 with a built-in rod (or string) length adjustment system. Figure 5 shows a string-magnet support system with a spring-loaded stopper 17, as the length adjustment system. The clip-on device therefore can be attached to any

unmodified headwear where it can find an appropriate location for attachment i.e. onto the brim of a hat or cap. Note In Figures 4 and 5, a spring-loaded stopper 17, was shown as the length adjustment system. It should be aware that other string length adjustment system, such as a mini-wheel spool with lockable rotation mechanism could be used instead. Another string length adjustable system using hook and loop fastener has been developed and is illustrated in figures 8A and 8B to be described later.

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Figure 6 shows a different application method of the present invention, whereby the supporting system is placed centrally in the brim of the headwear, such that now the support system acts on the nose bridge 23 of the spectacle. Also, a variation of the hook-shape tip is shown, whereby it now consists of two malleable hook-shaped ends 24, which brings extra adjustability to the design, by allowing the spectacle frame to rest stably at the correct angle relative to the wearer's eyes.

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Figure 7A shows a spectacle support system consisting a visor cap, with support rods 12 that has a magnetic piece 25 located at each end of the support rod. Thus hook shaped support end is not needed, provided the spectacle contains magnetically attractive materials as described in Figure 4. The top part of the support rod is attached to a flexible and stretchable section 26, which allows limited resistive semi-permanent length adjustments and bending movements (e.g. a concertina section as described earlier), such that the normal optimal resting position of the spectacle can be quickly adjusted for. Once the optimal resting position is found, the flexible section should remain stable, unless a significant greater force than the weight of the spectacle is applied.

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When the supporting rods are not in used, it can be folded (via bending the flexible section 26) to lie neatly on the underneath side of the brim 11 as shown in Figure 7B. To prevent the support rod from dropping downward when not in used, there is a resting site 5 27 for each support rod, which contains magnetically attractive metal attached to the underside of the brim. If non-magnetic system is employed, then the resting site may consists of a soft loop or hook to secure the support rod. Note that the support rods shown in Figures 7A and 7B have the optional feature of being 10 slightly curved, so that it conforms to the brim's shape when the supports rods are not in use and hidden underneath the brim.

Figures 8A and 8B show another spectacle support system using string and magnet, but now showing a setup whereby the 15 length and position of the support string 18 can be adjusted to a very high level of preference, by means of a 'hook and loop' fastener and holes adjustment system. On each side of the brim of the hat now consists of at least one hole 28 where the string-magnet system hangs from. There could be several such holes 28 20 made in the brim of the hat as shown, so as to offer a choice of hanging positions. The upper part of the string continues pass the upper part of the brim and passes through another hole, which is labelled 29 as shown in figure 8A. The end of this string is attached to a small piece of one part of a hook and loop fastener (i.e. the 25 loop part 30), as shown in figure 8B. The other part of the hook and loop fastener (i.e. the hook part 31) is a long strip of a few centimetres in length that is either stitched on, or via self adhesive backing, attached to the underside of the brim, close to hole 29, as shown. Thus the length of the support string 18 can be 30 independently adjusted by moving part 30 relative to part 31, to

obtain the best fitment according to the peculiarities of the individual user of the present invention.

The above-mentioned embodiments have been described by way of example only. It would be understood that modifications may be made to the specifics of these examples without departing from the scope of the present invention. For examples, in the description so far, the headwear as shown has a protrusion (i.e. the brim of the hat), which is ideal for attaching the support rod or string for the purpose of this invention. For headwear that does not have any appropriate protrusion, it is quite simple to modify the above description by adding a protruding object in the attachment systems described above. The protruding object could then be attached to the headwear by the usual available means e.g. clips, pins, Velcro, sewing etc. Furthermore, although one of the strengths of the present invention is its adoptability with current existing headwear, it is also feasible to design bespoke headwear with the specific purpose of adopting it with the spectacle supporting systems described above. Such bespoke headwear may be made especially comfortable by using hypoallergenic materials at the contact areas, as well as making it especially light, breathable and/or cool to the head (e.g. just having a minimum frame structure that does not cover the entire head, like the visor cap shown in Figure 7A). Also the headwear can be adopted to give a wider support over both the nasal and ear regions e.g. a hat with a brim extending over the ear regions, and if necessary built to adopt more than one support rod or string for each side of the temple arm of the spectacle.